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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/855,806	05/16/2001	Masami Akimoto	OMY-010	1549

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EXAMINER

CROWELL, ANNA M

ART UNIT PAPER NUMBER

1763

DATE MAILED: 06/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/855,806

Applicant(s)

AKIMOTO ET AL.

Examiner

Michelle Crowell

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,5-10,12-18 and 23-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5-10,12-18 and 23-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 9, 23, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671).

Referring to Figure 5 and column 6, lines 20-47, and column 7, lines 50-64, Somekh discloses a cluster tool apparatus used to deposit a metal layer by electrodeposition and then polish the layer by chemical mechanical polishing (CMP) in a reduced pressure environment. A central substrate-handling robot 18' (transfer mechanism, first delivering and receiving portion) transfers the substrate between the electrodeposition stations 14 (conductive film forming

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chamber) where the conductive film copper (oxidization-prone film) is deposited on the substrate, the CMP apparatus 16' (polishing chamber), the dual load lock chamber 80, the rinse/clean/dry station 82 (cleaning chamber), and the metrology station 86. In the rinse/clean/dry station 82, a combination of a brush/scrub cleaner with a centrifugal drier or a rinse bath with an isopropyl alcohol (IPA) vapor drier may be used. Alternately, drying may occur in the load lock chamber 80 (drying chamber) using a heater 98 and air jets from nozzles 100. Furthermore, a path for transferring the substrate between the transfer mechanism 18 under reduced pressure and a location (load lock chamber 80) outside the apparatus under atmospheric pressure is shown in Figure 5.

Somekh fails to teach a drying chamber with a first and second transferring ports and a CVD chamber.

Referring to Figure 9, column 6, line 22 – column 7, line 1, and column 7, lines 36-47, Kondo teaches a multi-processing chamber which includes the following units: washing unit 80, rinsing unit 90, drying unit 70 or 500, and CVD film forming unit 200. The heating and drying chamber 500 heats the wafer using infrared ray lamps 503. In addition, nitrogen gas (inert gas) is supplied drying chamber via gas blowing conduit 501. Inert gases are used drying since they do not react with wafer or chamber. After the wafer leaves the heating and drying chamber 500, wafer carrier mechanism 31a (transferring mechanism, first delivering and receiving portion) transfers the wafer into the CVD process tube 2 (CVD film form chamber operating at reduced pressure). The drying chamber 500 includes two gates G3 and G4 (first and second transferring port which allows various processing to take place before and after the drying process. In addition, an exhaust pipe 502 is connected to vacuum pump 41 is provided to the drying chamber

500, and therefore the drying chamber is capable of operating under a reduced pressure (col. 7, lines 45-47). Furthermore, a path for transferring the substrate between the transfer mechanism 31a under reduced pressure and a location (load lock chamber 600) outside the apparatus under atmospheric pressure is shown in Figure 8. This path is connected to the first transferring port. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Somekh with the first and second transferring ports in the drying chamber and the CVD chamber of Kondo. This would allow processing to take place before and after the drying stage in order to yield the desired product.

4. Claims 5-7, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671) as applied to claims 1, 9, 23, and 25 above, and further in view of Hashimoto (Japanese Patent Publication 07-183299). The teachings of Somekh in view of Kondo have been applied above. Somekh in view of Kondo fail to teach a conductive film formed with an insulating film having a recessed portion embedded with the conductive film and a plurality of drying chambers.

Referring to the abstract, constitution, and Figure 1, Hashimoto teaches a groove (recess) formed in an insulating film 2 of a silicon substrate 1. Next, a copper film 4 is deposited over the insulating film to embed the groove. It would have been obvious to one of ordinary skill in the art at the time of the invention for the substrate of Somekh in view of Kondo to have an insulating film with groove as taught by Hashimoto. It is standard procedure to form fine copper wirings by embedding a copper film in a groove of an insulating film.

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5. Claims 8 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671) and Hashimoto (Japanese Patent Publication 07-183299) as applied to claims 5-7 and 10 above, and further in view of Matsuskawa et al. (U.S. 5,518,542).

The teachings of Somekh in view of Kondo and Hashimoto have been applied above.

Somekh in view of Kondo and Hashimoto fails to teach a plurality of vertically stacked drying chambers.

Referring to Figure 1 and column 3, lines 12-22, Matsuskawa teaches a substrate processing apparatus having a plurality of vertically stacked drying chambers. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the substrate processing apparatus of Somekh in view of Kondo and Hashimoto with the vertically stacked drying chambers as taught by Matsuskawa. By providing a plurality of vertically stacked drying chambers, more wafers are dried and hence substrate throughput is increased. In addition, the vertically stacked configuration decreases footprint, thereby minimizing the space necessary for containing the apparatus.

6. Claims 12, 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671) as applied to claims 1, 9, 23, and 25 above, and further in view of Soraoka et al. (U.S. 5,855,726).

The teachings of Somekh in view of Kondo have been applied above.

Somekh in view of Kondo fail to show a first substrate carrier.

Referring to Figure 3, and column 5, lines 31-61, Soraoka shows an atmospheric transfer robot 9 (first substrate carrier, second delivering and receiving portion) that moves along rail 92 to transfer samples from cassettes 12A-D to load lock chambers 4 and 5. In addition, vacuum transfer robot 10 (first delivering and receiving portion) moves samples from the load chambers 4 and 5 to the processing chamber 6 and post-treating chamber 7. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the processing chambers of Somekh in view of Kondo with the first substrate carrier as shown by Soraoka. This would allow wafers to be transferred to/from a processing chamber.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671), and Soraoka et al. (U.S. 5,855,726) as applied to claims 12, 13, and 16 above, and further in view of Henley et al. (U.S. 6,153,524). The teachings of Somekh in view of Kondo and Soraoka have been applied above.

Somekh in view of Kondo and Soraoka fail to show an etch chamber.

Referring to Figure 3 and column 11, lines 2-9, lines 20-25, Henley teaches that it is known to use an etch chamber in a multiprocessing apparatus. The etching chamber can etch a desired pattern on a substrate layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Somekh in view of Kondo and Soraoka with a CVD chamber and etching chamber as taught by Henley. This would allow substrate to be etched in order to yield the desired product.

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8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671), and Soraoka et al. (U.S. 5,855,726) as applied to claims 12, 13, and 16 above, and further in view of DeOrnellas (U.S. 5,672,239).

The teachings of Somekh in view of Kondo and Soraoka have been applied above.

Somekh in view of Kondo and Soraoka fail to show resist removing chamber.

Referring to Figure 2 and column 4, lines 9-11, DeOrnellas teaches a strip module 24 (resist removing chamber) which uses oxygen plasma to strip the photoresist on the wafer. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Somekh in view of Kondo and Soraoka with the strip module as taught by DeOrnellas. This would allow the photoresist film to be removed after substrate processing.

9. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable Somekh et al. (U.S. 6,110,011) in view of Kondo et al. (U.S. 5,303,671) and Soraoka et al. (U.S. 5,855,726) as applied to claims 12, 13, and 16 above, and further in view of Matsuskawa et al. (U.S. 5,518,542).

The teachings of Somekh in view of Kondo and Soraoka have been applied above.

Somekh in view of Kondo and Soraoka fail to teach a second substrate carrier.

Referring to Figure 1 and column 3, lines 1-11, Matsuskawa teaches an apparatus having a second substrate carrier 5 perpendicularly connected to the first substrate carrier 4. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the first substrate delivering and receiving portion of Somekh in view of Kondo and Soraoka with

the second substrate carrier as taught by Matsuskawa. By providing a second substrate carrier, throughput of various processes is increased.

Response to Arguments

10. Applicant's arguments filed March 20, 2003 have been fully considered but they are not persuasive.

Applicant has argued that Somekh nor Kondo teaches a CVD film forming chamber in reduced pressure and a drying chamber in a reduced pressure.

As discussed both the drying chamber 500 and the CVD film forming chamber 200 is connected to pump 41, and thus both chambers are capable of operating at a reduced pressure.

Applicant has argued that a first delivering and receiving portion and a second delivering and receiving portion have not been disclosed.

The first delivering and receiving portion includes the transfer mechanism section in both Somekh and Kondo. The second delivering and receiving portion includes the atmospheric transfer robot section in Soraoka. Furthermore, with respect to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981), *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant has argued that the loadlock chambers in Soraoka are not the same as recited in claim 12.

Applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Soraoka was simply used to teach an atmospheric robot carrier.

Note. Applicant's argument regarding "mere duplication of parts" is moot in view of the new grounds of rejection.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sakamoto, Nanbu, and Koyama disclose wafer transfer mechanisms.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (703) 305-1956. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

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AMC
June 2, 2003

*File Copy
Luz L. Hernandez
Primary Examiner
Art Unit 1763*